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REPORTS FROM THE HAPLOCHROMIS ECOLOGY SURVEY TEAM

(HEST) OPERATING IN THE MWANZA AREA OF LAKE VICTORIA

32:

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INTRODUCTION

Although the major aim of the research of the Haplochromis Ecology Survey Team concerns the stock of haplochromine cichlids (so-called Furu) in the Tanzanian part of Lake Victoria, observations on other fishes caught simultaneously with haplochromines are made as well. Of these fish species Nile Perch (Lates niloticus) is of particular interest because it is a voracious predator on haplochromines and other fishes. In areas where Nile Perch became established, a strong decline and sometimes even a virtual depletion of the haplochromine stock was the result (Arunga, 1981; Okemwa, 1981;1984). In this paper our preliminary observations made on Lates niloticus during our survey on haplochromines are discussed.

ORIGIN OF THE DATA

Data were obtained from catches made by the HEST-trawler R.V. Kiboko, which became operational in May 1984 and by a number of other trawlers operating in the Mwanza Gulf and the Speke Gulf (Table I). As not all catch-reports have been worked out properly at this moment, in most cases only estimates of catch-rates can be given.

RESULTS

I. Distribution and catch-rates.

In the following paragraphs observations on catches from different areas of the Tanzanian part of Lake Victoria are given (fig.1).

a) Mwanza Gulf: depth, 5-18 m; bottom, soft mud.
Catch-reports of the R.V. Mdiria of the Freshwater Fisheries Research Institute Nyegezi show that from 1972 on, when this ship became operational, Nile Perch was caught in the Mwanza Gulf. According to these records large specimens were only caught occasionally. In the period 1974 through 1976 the percentage of occurrence of Nile Perch in the trawl-catches as well as the mean catch-rate per hour increased (Table II; Kukowski, 1978). In 1977 there was a decline. Since that time a slow increase of Lates niloticus in the catches was observed, until a sudden acceleration during the past 2 years. Nile Perch is now occurring in virtually every trawl-catch in the Mwanza Gulf and, concerning catch-rate, it is the second important fish (approx. 170 kg/h) after the haplochromines (approx. 600 kg/h).
Until recently the Nile Perch catches comprised only large specimens of more than 10 kg, but in the middle of 1984 suddenly large amounts of small perches (15-30 cm SL; approx. 0.5-2 kg) appeared. Juveniles of approximately 2 cm SL were caught during the second half of 1983 with a mosquito-net beach-seine along the shores of the Mwanza Gulf (Nyegezi Bay). In beach-seine catches of local fishermen Nile Perches are now common. Such catches are normally done in shallow areas with a sand bottom

b) Magu area (Speke Gulf): depth, 6-30 m; bottom, mud in shallow areas, sand and gravel in deeper water. Sixteen trawlshots of the R.V. Mdiria in the Magu area in November 1983 yielded average Nile Perch catch-rates of 200 to 250 kg/h. Haplochromine catches were exceptionally low (40 to 300 kg/h, depending on area).

c) Nafubo area (Speke Gulf): depth, 8-12 m; bottom, probably sand.
Until the end of 1983 catches in the Nafubo area were still dominated by haplochromines. Concerning catch-rate, these catches were comparable to those in the Mwanza Gulf. In the course of 1984 the catch composition changed dramatically in favour of Lates niloticus. As a result the 35 ft wooden trawler from Nansio (Ukerewe) which exploits the Nafubo area, changed its fishery from haplo-

chromines to Nile Perch. In July, 1984 the R.V. Ningu of the Mwanza Fisheries Research Centre caught approximately 20kg/h haplochromines in Nafubo area. In the Mwanza Gulf the same vessel has an average catch-rate of 150-200 kg haplochromines per hour.

d) North of Ukerewe: Grant Bay, depth, 6-8 m; bottom, mud; near Ukara Island, depth 6-8 m; bottom, mud.
In June 1984 four trawlshots were made with the R.V. Kiboko in the area North of Ukerewe. These catches yielded 500-550 kg Nile Perch per hour and less than 10 kg haplochromines.

e) Deep, offshore areas, North and West of Ukerewe and North, North West of the Mwanza Gulf: depth, 50-60 m; bottom, probably mud.
Approximately twenty trawlshots were made with the R.V. Kiboko in these areas in June 1984. Each catch contained 80 to 150 kg Nile Perch per hour. The sizes of these fishes ranged from 0.5 up to 40 kg. The average catch rate of haplochromines at these depths was approximately 150 kg/h.

II. Food of the Nile Perch.

Stomach contents of approximately 200 specimens have been examined and in all haplochromines are the major prey items. However, in deep water (50-60 m) most fishes probably fed on the shrimp, Caridina nilotica. In these deep-water-catches the stomachs of the Nile Perches were generally squeezed through the mouth by the swimbladder, which expanded due to the large pressure difference between bottom and water surface. In such catches the frequently observed lumps of shrimps were probably the stomach-contents of Nile Perch, which was nearly the only large fish in the catch.

DISCUSSION

Habitat preference.

The present observations on Nile Perch suggest that it occurs in virtually every habitat of the Lake, with the possible exceptions of rocks and swamps and the pelagic habitat. According to other authors Lates niloticus was mainly restricted to shallow waters over sand bottoms where the oxygen concentration is relatively high (Arunga, 1981; Okemwa, 1984). Greenwood (1966) and Hopson (1972) mention mass mortalities of Lates niloticus in Lake Albert and Lake Chad respectively, which were probably due to low oxygen concentrations. Greenwood (op.cit.) quoted the experimental work of Fish (1956) which proved that L.niloticus has a relatively high oxygen demand compared to other fresh water fishes. Due to stratification during approximately six months of the year the oxygen concentration is very low (less than 10% of saturation) within the lower most 5 m of the water column in the deep offshore areas (Talling, 1966). In other periods the oxygen concentration is still low (often less than 3 mg/1) as compared to the littoral areas (6-7 mg/1). It is therefore remarkable that Nile Perch occurs in the deep-water catches. Two possible explanations for this phenomenon can be given:
1) The catches were made in the dry season during which normally the stratification breaks down (Talling, op.cit.). So at that period the oxygen concentration could have been sufficient for Lates niloticus. During periods of low oxygen concentration the fishes should die, or migrate back to shallower areas.
2) There are two species of Lates present in the Lake, one preferring shallow water, the other living in deep water. The Nile Perch was introduced from Lake Turkana and Lake Albert (Arunga, 1981) and in both lakes a shallow and a deep water species of Lates occurs (L.niloticus and L.longispinus in L. Turkana; L.niloticus and L.macrophthalmus in L.Albert; Greenwood, 1976).

Expansion of the distribution area.

Although within ten years after the introduction small numbers of large Nile Perches were reported occasionally in catches throughout the Lake, observations of the vast expansion of these fishes cover only the past 7 years. In 1978 a sudden strong increase in the Nyanza Gulf was observed (Arunga, 1981). and in the following years a similar increase was reported near Ukerewe and subsequently in the Speke Gulf. Apparently the expansion of the Nile Perch moves from North to South. The mechanism of the "sudden" colonisation of an area is not yet clear, but probably it is the result of a subsequent expansion from area to area rather than the result of reproduction of a number of immigrants in a certain area.

Impact of Nile Perch on other fish species.

The impact of Nile Perch on almost all other fish species within its distribution area is dramatic. In the Nyanza Gulf stocks of almost all other fishes declined or virtually depleted, with exception of the zooplanktivorous Rastrineobola argentea (dagaa) and Oreochromis niloticus (Arunga, 1981; Muller & Benda, 1981; Okemwa, 1981;1984). The latter species is only abundant in shallow areas near the papyrus fringes where Nile Perch is not very abundant (Arunga, 1981). R.argentea appears to coexist with Lates in both Lake Kioga and the Nyanza Gulf (Arunga, op.cit.). Catches by the R.V. Kiboko near Ukerewe also yielded relatively large amounts of R.argentea (pers.obs.). Possibly these pelagic fishes are less sensitive to predation by the demersal Nile Perch, than benthic fishes. For the same reason zooplanktivorous and phytoplanktivorous haplochromines which are partly (or mainly) pelagic might be better suited to coexist with Nile Perch than the benthic haplochromines.
Although for the time being the strong increase of Lates seems a favourable development, the final consequences may be very serious for the fish production of the Lake. In the first place adding one step to a food chain generally causes an energy loss of 80%. Secondly a large number of haplochromines are primary consumers (detritus and phytoplankton), when these are depleted, a major part of the energy input in the Lake may be cut off for fish-production. The same holds for special food sources like molluscs that are fed on by specialized haplochromines. The mentioned effects may finally result in a strong decrease of total fish yield of the lake.

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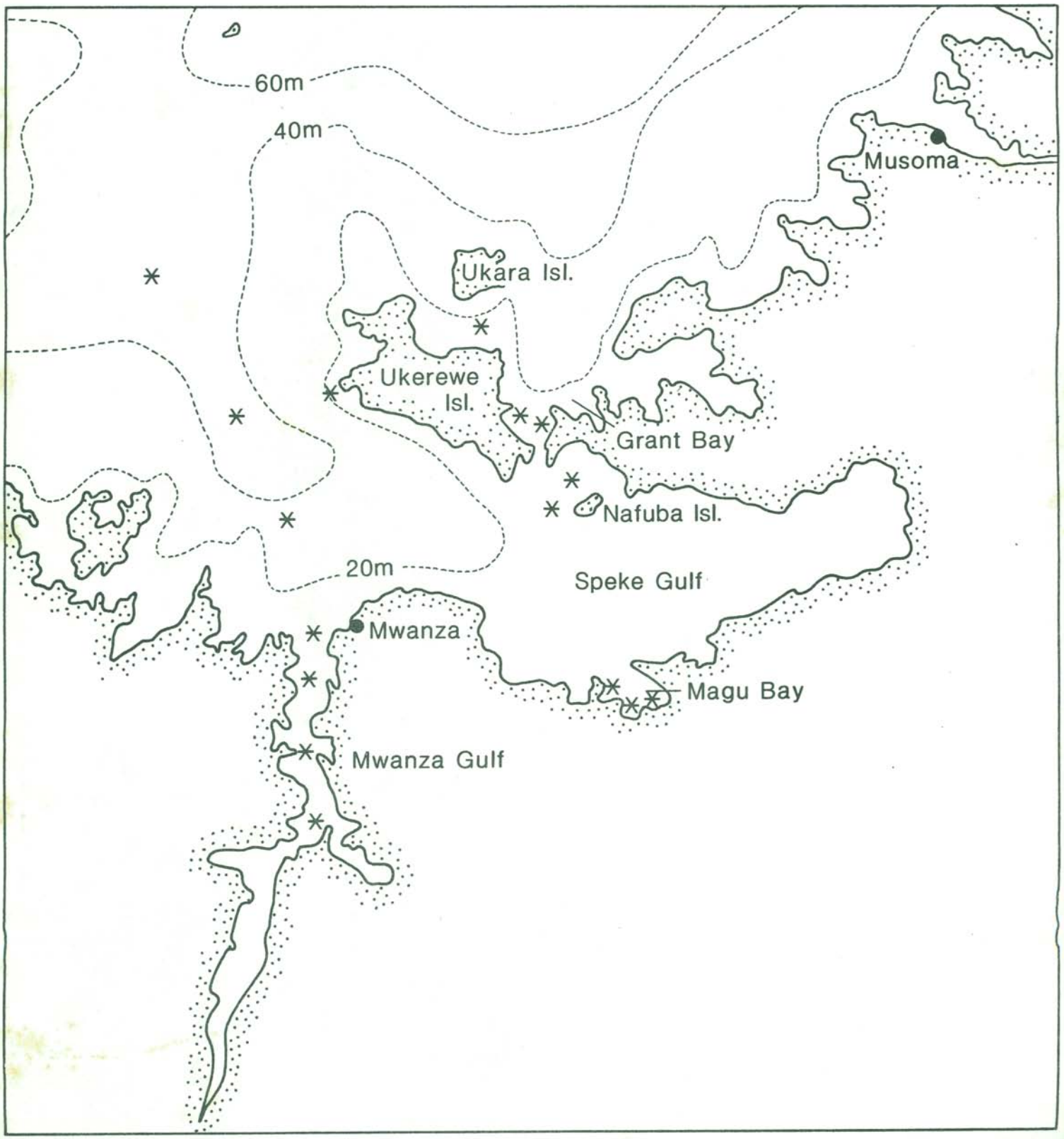

Fig. 1. Map of the South-East part of Lake Victoria with locations (*) at which Nile Perch catches discussed in the present paper were made.

TABLE I

Trawlers from which catch data on Nile Perch were obtained.

name	length in m	hp	headrope net in m	cod end mesh size in mm
R.V. Mdiria	14.8	120	25	89; 19
R.V. Kiboko	12	105	25	19
R.V. Ningu	10	60	?	19
trawlers fishmeal factory	16.8	170	21	19

TABLE II

Nile Perch catches in the Mwanza Gulf. 0-18 m depth with a 89 mm cod end mesh size (data of 1974 through 1977 from Kukowski, 1978).

year:	1974	1975	1976	1977	1984
% frequency occurrence	5	6	15	10	100
% of total catch weight	+	+	2	1	approx. 20%
catch rate kg/h	1	1	2	1	approx. 175

+ Indicates presence; less than 0.5%.